

### REMARKS

The Specification has been amended to correct a typographical error. No new matter has been added.

Claims 1, 24, 30, 49, 52, and 72 have been amended. No new matter has been added. Claims 14-23, 25-29, 42-48, 63-71, and 73-77 are withdrawn from consideration. Claims 1-13, 24, 30-41, 49-62, and 72 are currently pending in this application.

Applicant thanks the Examiner for acknowledging receipt of Applicant's Information Disclosure Statement filed September 26, 2003 and December 14, 2004. However, the Examiner's initials were not present on the copies of the PTO/SB/08 forms attached to the Office Action. Applicant respectfully requests replacement copies having the Examiner's initials.

Claims 1, 8-11, 30-32, 39-41, 52 and 59-62 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Mann et al., U.S. Patent No. 6,768,149 (Mann). This rejection is respectfully traversed.

Mann relates to a sensor having a photodetector and a transistor acting as a reset switch. Mann at col. 3, lines 1-3. The transistor is formed with a transistor having a gate with p and n-type regions. A p-type well is formed to partially dope the channel of the transistor. Mann at Abstract. Mann teaches that the combination of the p-type well and the p-type gate region increases the reset voltage level required to deplete the reset channel. Additionally, Mann discloses that the gate is formed having a length at least 20 percent longer than the process minimum, which also increases the potential required to deplete the reset channel. Mann at col. 4, lines 3-23.

Mann fails to disclose all limitations of any of claims 1, 8-11, 30-32, 39-41, 52 and 59-62. As amended, independent claims 1 and 30 each recite, *inter alia*, "first and second gate regions each having a work-function greater than a work-function of n+ Si."

Similarly, amended independent claim 52 recites, *inter alia*, “forming first and second gate regions each having a work-function greater than a work-function of n+ Si.” Mann fails to disclose at least these limitations of claims 1, 30 and 52. While Mann discloses that the reset switch transistor gate includes two regions, Mann only discloses that one region is p-type, which has a work function greater than a work-function of n+ Si. For at least these reasons, withdrawal of this rejection is respectfully requested.

Claims 2, 7, 12-13, 33, 38, 53, and 58 stand rejected under 35 U.S.C. § 103 as being unpatentable over Mann. This rejection is respectfully traversed.

Claims 2, 7, 12-13, 33, 38, 53 and 58 each depend from one of claims 1, 30 and 52. As noted above, Mann fails to disclose, teach or suggest all limitations of amended independent claims 1, 30 and 52. For at least these reasons, withdrawal of this rejection is respectfully requested.

Claims 3-6, 24, 34-37, 54-57, and 72 stand rejected under 35 U.S.C. § 103 as being unpatentable over Mann in view of Ponomarev et al., Gate-Workfunction Engineering using Poly-(Si,Ge) for High-Performance 0.18 $\mu$ m CMOS Technology, IEDM 1997 (Ponomarev). This rejection is respectfully traversed.

As discussed above, Mann fails to teach or suggest all limitations of amended independent claims 1, 30 and 52. Ponomarev does not supplement the deficiencies of Mann. Specifically, Ponomarev is silent about “first and second gate regions each having a work-function greater than a work-function of n+ Si,” as recited by amended independent claims 1 and 30; and “forming first and second gate regions each having a work-function greater than a work-function of n+ Si,” as recited by amended independent claim 52. Ponomarev does teach transistor gate having a bottom layer of poly-SiGe and a top layer of poly-Si to retain the standard silicidation scheme. Accordingly, Ponomarev also fails to teach or suggest the above limitations of independent claims 1, 30, and 52.

As amended, claim 24 recites a pixel cell comprising, *inter alia* “a photo-conversion device at a surface of a substrate” and “a transistor formed adjacent to the photo-conversion device, wherein a gate of the transistor is a mid-gap material.” Similarly, amended claim 72 recites a method of forming a pixel cell comprising, *inter alia*, “forming a transistor adjacent to the photo-conversion device, the act of forming the transistor comprising forming a gate of a mid-gap material and overlying a channel region” Mann fails to teach or suggest these limitations.

To supplement Mann’s deficiencies, the Examiner states that it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the polysilicon gate electrode of Mann with a mid-gap material. Applicant respectfully disagrees. Mann teaches forming only a portion of the reset gate as p-type to increase work function. Mann also teaches a p-type well below the n-type portion of the reset gate to partially dope the channel of the transistor. Mann at Abstract; FIG. 2.

Replacing Mann’s gate with a mid-gap material taught by Ponomarev would defeat the purpose of Mann’s design. Specifically, Mann teaches that the combination of the p-type well and the p-type gate region increases the reset voltage level required to deplete the reset channel. When a first potential is applied to Mann’s gate, the channel well portion farthest away from the photodetector is depleted. A second voltage is applied to punch through a second channel portion closest to the photodetector, thereby discharging the photodetector. Due to Mann’s transistor design, the voltage on the gate can then be reduced to collapse the second portion of the channel before the first portion so that charges in the channel are swept away from the photo-detector. Mann at FIG. 5. Thus, one of ordinary skill in the art at the time the invention was made would not have been motivated to combine Mann and Ponomarev as suggested by the Examiner.

For at least these reasons, withdrawal of the rejection of claims 3-6, 24, 34-37, 54-57, and 72 is respectfully requested.

Claims 49-51 stand rejected under 35 U.S.C. § 103 as being unpatentable over Mann in view of Boon, U.S. Patent No. 6,198,087 (Boon). This rejection is respectfully traversed.

Like independent claims 1 and 30, amended independent claim 49 recites, *inter alia*, "first and second gate regions each having a work-function greater than a work-function of  $n^+$  Si." Therefore, as discussed above, Mann fails to teach or suggest all limitations of amended independent claim 49. Boon is cited for teaching a processor and does not supplement the deficiencies of Mann. For at least these reasons withdrawal of this rejection is respectfully requested.

In view of the above amendment, applicant believes the pending application is in condition for allowance.

Dated: May 25, 2005

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